



# **Will Increasing the Use of Distributed Generation Cause Brownouts in Air Quality?**

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# DG Definition

- **on-site generation of electricity**
- **size typically less than 1 MW [could be up to 10 MW]**
- **historically a diesel engine coupled with a generator used during power outages**
- **can be on “either side of the meter”: load or peak shaving, customer generation**



# EPA Guidance

- **Historically, emergency generators considered dirty, but used infrequently for emergency operation**
- **In Sept., 1995 EPA issued guidance to states**
  - **defined emergency generators**
  - **recommended their use be limited to 500 hr/yr including O&M**
  - **air pollution limitations left to states**



# Today's DG Trend

**DG units being used more for peak load situations, both on and off the grid, to avert blackouts**

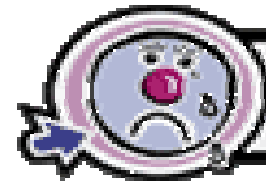
**DG owners want to be able to use their units more often to take advantage of higher electricity prices during higher load situations**

**Some types of DG units are being used to meet increased demand for high quality power and reliability by certain types of industries; e.g., credit card operations, airline reservations**

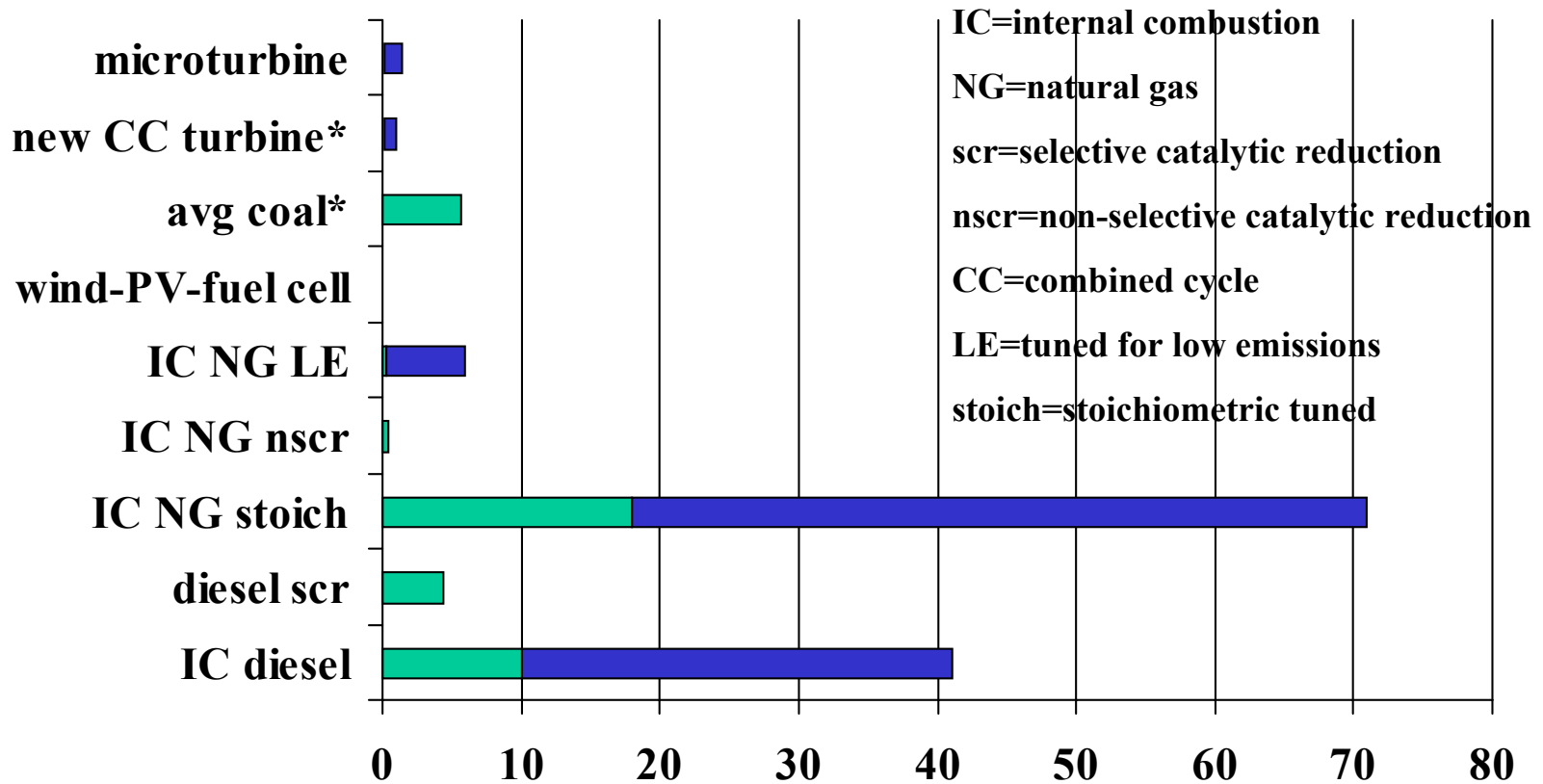
**By the year 2010, a DG unit in every back yard??**



**Unfortunately the range of  
technologies that constitute DG  
are not all environmental  
friendly**



## Emission Comparison NO<sub>x</sub> (lb/MWh)



\* Central generation with pollution controls

  Indicates a range of potential emissions-lower to higher end

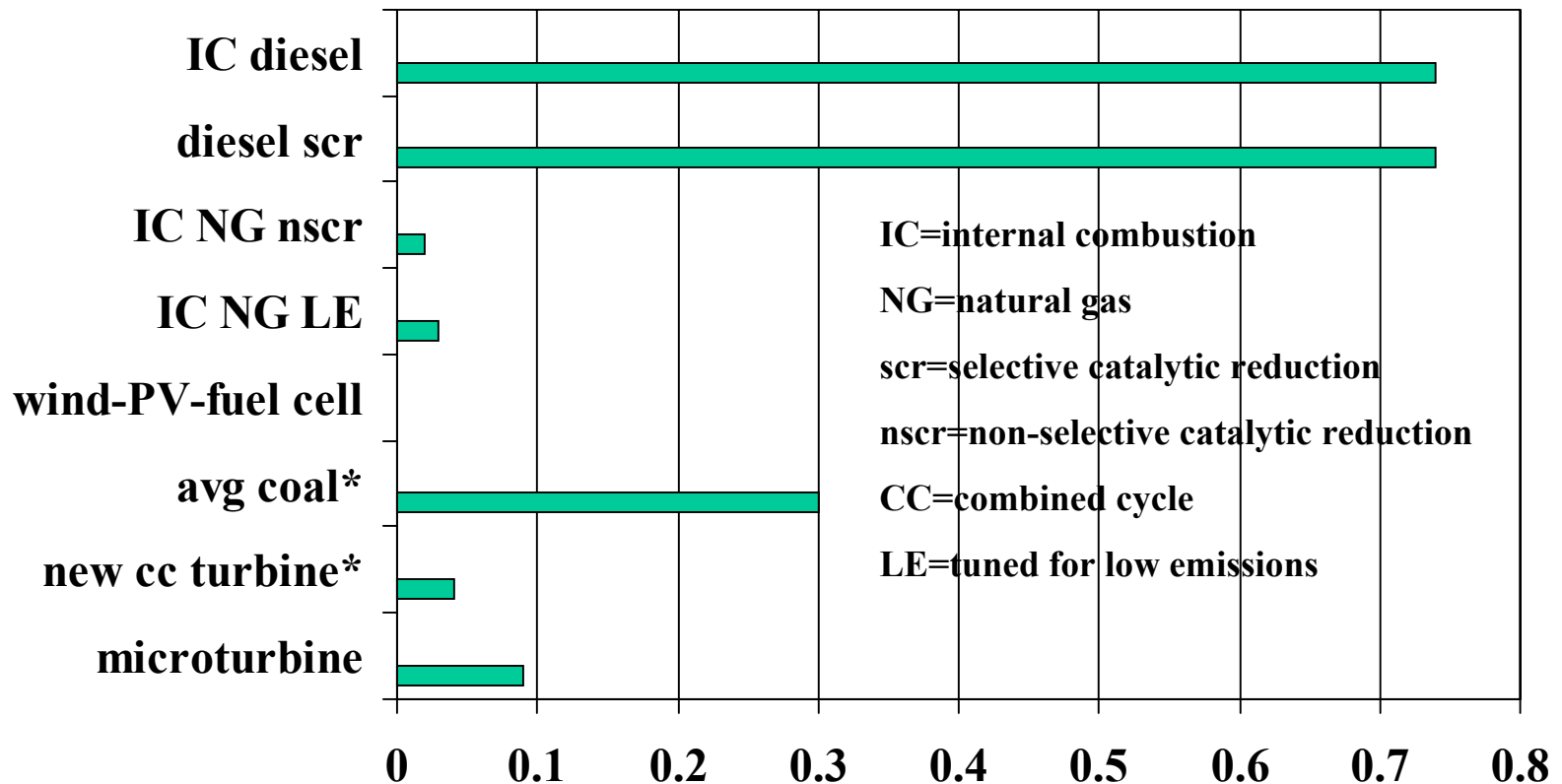
Sources: Nathanael Greene & Roel Hammerschlag, *Electricity Journal*, June, 2000; and also Bluestein, Joel. *Environmental Benefits of Distributed Generation*, 12/18/00



**Peak load days most often occur in the hot summer months and may correspond with Ozone alert days - a bad time for NO<sub>x</sub> emissions and diesel generators.**

Below the text, there are two horizontal lines: a blue one on top and a green one below it.

## Emission Comparison PM-10 (lb/MWh)

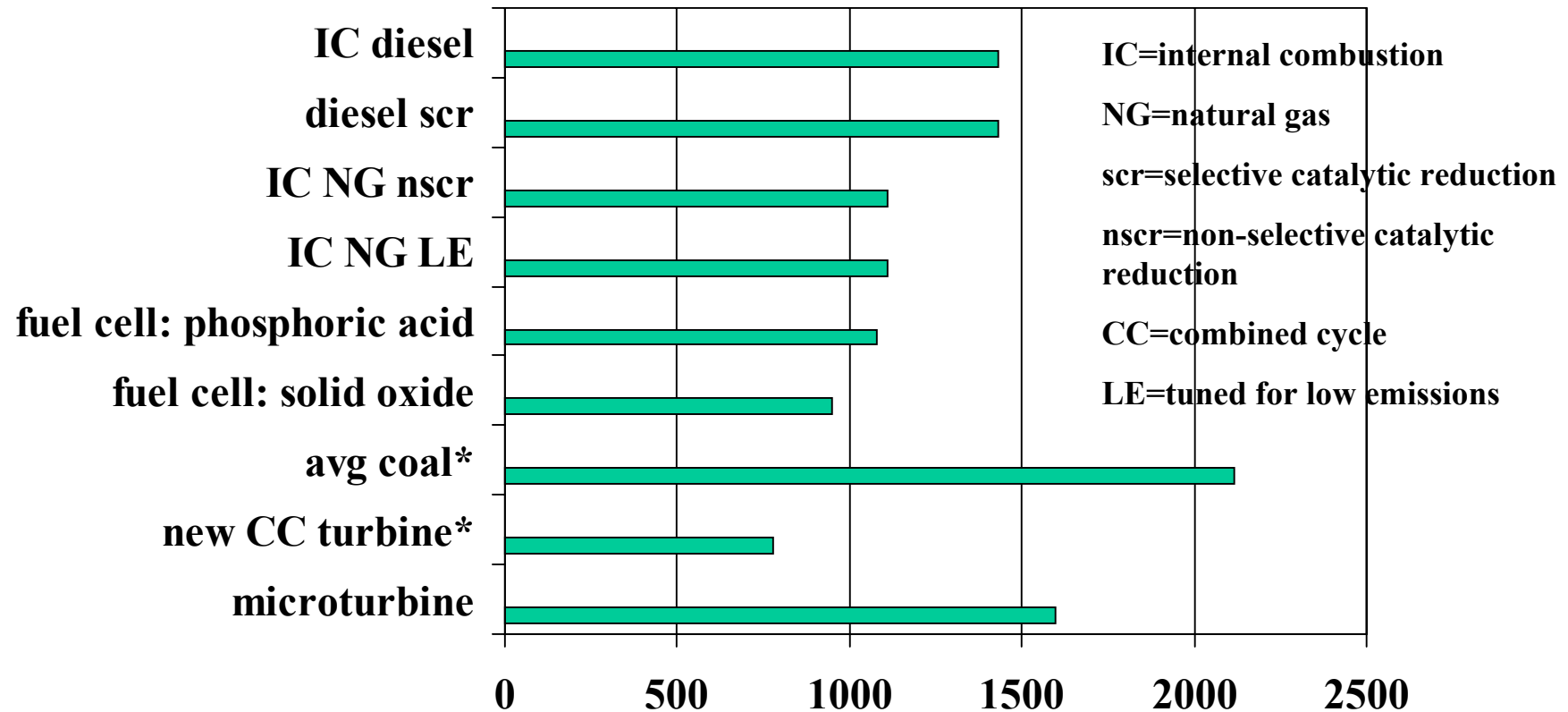


\* Central generation with pollution controls

Source: Bluestein, Joel. *Environmental Benefits of Distributed Generation*, 12/18/00



## Emission Comparison CO2 (lb/MWh)



\*Central generation with pollution controls

Source: Bluestein, Joel. *Environmental Benefits of Distributed Generation*, 12/18/00

**Each DG unit may be small with respect to generation size. Emissions from each unit may be minor despite high emissions rates. However, collectively many DG units have a capacity to generate large quantities of both electricity and emissions**

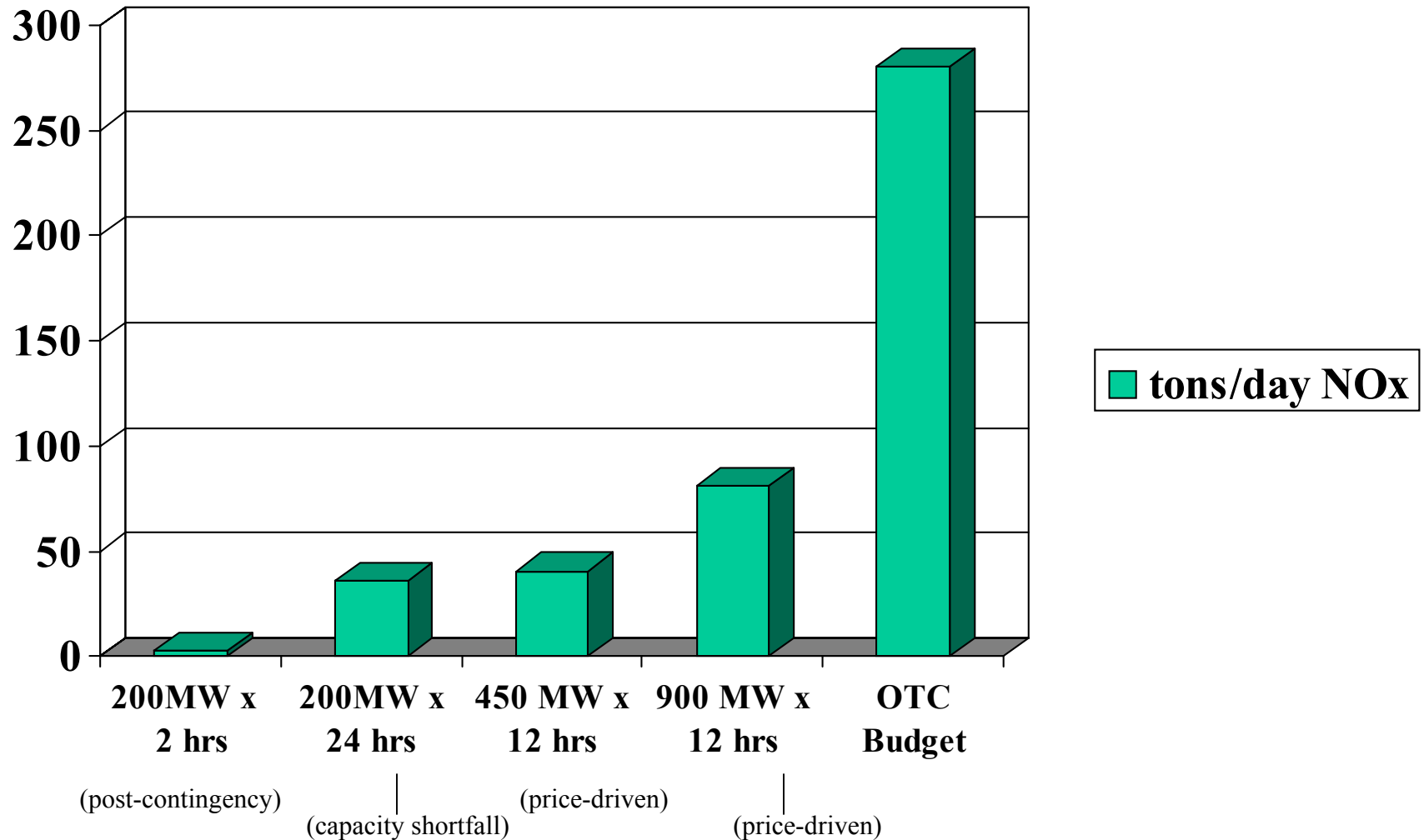
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**“If just 0.5% of the US demand for electricity were met by diesel engines, the country’s annual NOx emissions could increase by nearly 5%.”** *-The Electricity Journal, June 2000*

# Example of DG Potential Emissions Impact in CT

with the operation of even part of the 900 MW diesel DG capacity

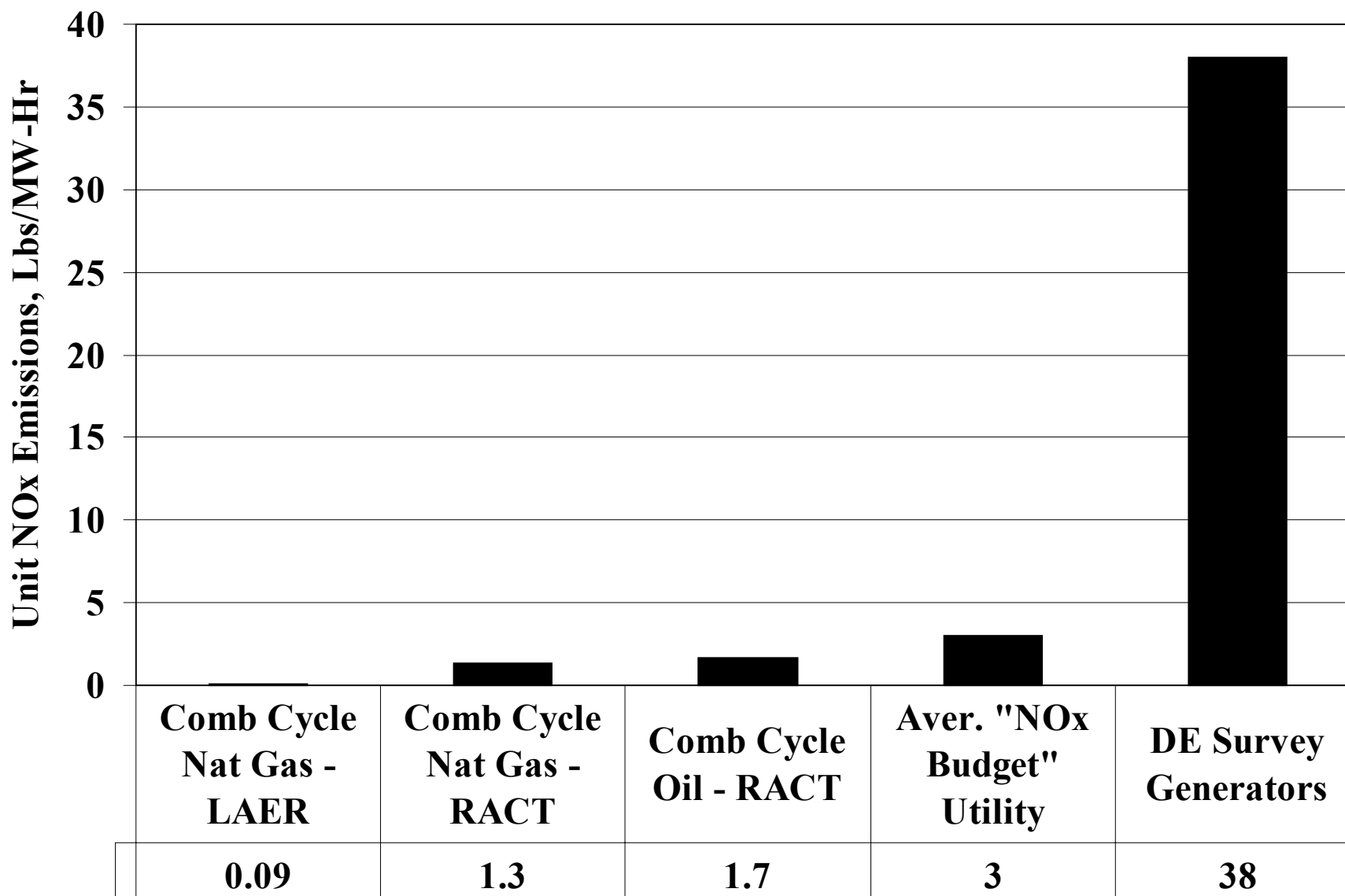




# Delaware DG Survey Results

- **67 DG units identified with a total capacity of 33MW**
- **99% of this capacity is diesel**
- **Most of these units are in the 500 to 1000 kw range**

## NOx Emissions per Megawatt-Hr Generated





**EPA's Science Advisory Board has stated in its July, 2000 Health Assessment Document for Diesel Exhaust that such exhaust "is likely to be carcinogenic to humans by inhalation at any exposure condition" (emphasis added)**



**The evolving trend in the increasing size and use of DG has the potential to significantly undercut air quality gains for NO<sub>x</sub> emissions and other pollutants achieved by central electric utilities and other major sources if not carefully regulated.**



**State regulation of DG units has been spotty and inconsistent. Some states exempt DG units all together from requiring a permit**





**In order to expand the use of DG while maintaining clean air it will be necessary to encourage the employment of new DG technologies such as fuel cells, gas microturbines, photovoltaic and wind, while simultaneously imposing mandatory pollution controls on diesel units.**